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ENVIRONMENT, SAFETY & HEALTH

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Environmental Protection Agency
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Attention: Section 8(e) Coordinator (CAP Agreement)

This submission is pursuant to the TSCA Section 8(e) Compliance Audit Program and CAP Agreement #8ECAP-0036. This information was inadvertently overlooked as we were assembling our final submission under CAP. This study has been added to the Monsanto final report for the CAP.

The information included is characterized as follows:

Chemical Identity: Santoflex 13: N-(1,3-dimethylbutyl)-N'-phenyl-1,4-benzenediamine
Chemical CAS No.: 793248

Information/Study Type: (II,B,2,b)/Acute, Environmental

Title: Santoflex 13 Degradation Toxicity Test with Daphnia magna
Study Identification #: MO-92-9050

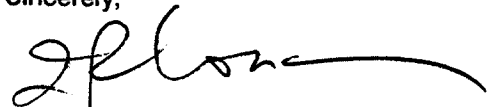
Summary of reportable adverse effects: Submitted due to a high order of toxicity in an aquatic organism.

It should be noted that environmental effects were previously reported for this material under the CAP, as shown on Appendix A.

It should be noted that this summary may not highlight all adverse effects that EPA may judge to meet TSCA 8(e) reportability.

No information in this submission is trade secret or confidential business information.

Sincerely,



J.R. Condray
Director, Regulatory Management
(314) 694-8883

uc
1/26/93

APPENDIX A

**Previous environmental effect submissions under #8ECAP-0036 for
Santoflex 13, CAS #793248**

**Acute Toxicity of Santoflex 13 to Daphnia (AB780121A)
Dynamic Toxicity of Santoflex 13 to Fatheads (AB780121B)
Acute Toxicity of Santoflex 13 to Selenastrum (BN780362)**

SANTOFLEX® 13 DEGRADATION TOXICITY TEST WITH DAPHNIA MAGNAINTRODUCTION

Santoflex 13 has been shown to undergo rapid chemical transformation (half-life 24 hours) in water (Saeger et al. 1978). The purpose of this study is to determine whether the toxicity of Santoflex 13 to Daphnia magna decreases concurrently with chemical transformation.

SUMMARY

Acute toxicity tests with Santoflex 13 and Daphnia magna were conducted immediately after spiking the chemical into well water and again after the chemical aged for 24 hours in well water. The results of the first test indicate that non degraded Santoflex 13 is highly toxic to Daphnia magna (LC50 = 0.51 mg/l). After the chemical aged in water for 24 hours, the toxicity was significantly reduced. A concentration of 1.0 mg/l (maximum aqueous solubility) was aged and tested and had no effect on the survival of the Daphnia.

MATERIALS AND METHODS

Procedures used in the acute toxicity test closely followed those described in the MIC Environmental Assessment Method for Conducting Acute Toxicity Tests with Daphnia magna (Grueber and Adams, 1980) and Methods for Acute Toxicity Tests with Fish, Macroinvertebrates and Amphibians (U. S. EPA, 1975). The Daphnia magna used in this test were cultured at the MIC aquatic laboratory. The adult Daphnia were fed a mixture of Purina trout chow and alfalfa daily. Daphnids known to be less than 24 hours old were separated from the adults and used for this test.

Santoflex 13 was obtained from P. R. Graham (MIC) and was used as the test chemical. Nominal concentrations are reported as milligrams of test compound per liter of dilution water (mg/l). Two tests were conducted; one immediately after spiking the chemical into the water and the second, 48 hours after spiking Santoflex 13 into water.

TEST I - The static toxicity tests were conducted in 250 milliliter (ml) beakers which contained 200 ml of test solution. The dilution water used in this study was well water from St. Peters, Missouri. For each test concentration, the appropriate amount of the test compound, dissolved in 100% acetone was pipetted into 1000 ml of dilution water and shaken vigorously for 1 minute. This solution was then divided into three 200 ml aliquots in triplicate beakers to provide appropriate replication. The remaining 400 ml were used for 0-hour DO, pH, alkalinity and hardness determinations. A control, consisting of the same dilution water and conditions but with no test compound or solvent, was established. A solvent control, containing a solvent concentration equal to the highest level of solvent in the test beakers was also used. The maximum solvent concentration was 1 ml/l in the highest test concentration and the solvent control. The nominal test concentrations were 4.0, 2.0, 1.0, 0.5, 0.25, 0

and 0 mg/l. All test vessels were maintained at room temperature. Test solutions were not aerated during the test. Ten daphnids were randomly assigned to each test vessel within 30 minutes after the compound was added for a total of 30 daphnids per concentration.

During this test, the dissolved oxygen concentration, pH, alkalinity and hardness and temperature of test solutions were monitored at the initiation (control only) and termination of the toxicity test in the high, middle and low control test concentrations. DO was measured by the Winkler titration method (SOP number EAS-80-SOP-006). The pH was measured with a Beckman pH meter (SOP number EAS-80-SOP-007). The total hardness and alkalinity determinations were conducted according to "Standard Methods for the Examination of Water and Wastewater: (1975) (SOP numbers EAS-80-SOP-008 and EAS-80-SOP-009). A complete analysis of the well water is presented in Table 1.

Test concentrations and corresponding percent mortality data derived from a definitive test are used to calculate the 48-hour median lethal concentration (EC50) and a 95% confidence interval by means of the method of Litchfield and Wilcoxon (1949). The EC50 is defined as the calculated nominal concentration of the test compound in dilution water which causes 50% immobilization in the test animal population at the stated exposure interval.

TEST II - A 1.0 mg/l test solution was made up by pipetting an appropriate amount of test compound dissolved in 100% acetone into 2 liters of water. The maximum acetone concentration was 1 ml/l. This solution was stirred for 24 hours and then a static test was conducted in the same manner as Test I. The nominal test concentrations were 1.0, 0.5, 0.25, 0 and 0 mg/l. These test concentrations were made by using serial dilutions of the 1.0 mg/l test solution.

RESULTS

The highest concentration of Santoflex 13 at which there was no discernible effect on the test animals during Test I was 0.25 mg/l. No effects were observed at any concentration in Test II. Tables 2 and 3 present a summary of the average observed percentage immobilization of the combined replicates (% dead per 30 *Daphnia*) at each test concentration after 24- and 48-hours of exposure. The calculated 48-hour EC50 values (Table 4) for Tests I and II are 0.51 and >1.0 mg/l, respectively. (Calculations used to determine the EC50 values are contained in Appendix I.) The data clearly show that the toxicity of Santoflex decreases if the chemical is allowed to age in water. This is consistent with the data of Saeger et.al. (1978) which demonstrates that the chemical transformation half-life of Santoflex 13 in water is <24 hours.

During the two 48-hour toxicity tests with Santoflex 13, the pH and dissolved oxygen ranged from 7.6 to 8.3 and 6.4 mg/l to 8.5 mg/l, respectively. The average temperature was 22.0 and the alkalinity and hardness ranged from 210 to 290 mg/l and 218 to 274 mg/l, respectively (Appendix I). The water quality parameters during the test period were considered to be normal.

TABLE 1. Average water quality characteristics of the dilution (city) water.

Characteristic	Well Water Measurement
Alkalinity (mg/l CaCO_3)	303
Hardness (mg/l CaCO_3)	297
pH (median)	8.10
Aluminum (mg/l Al)	0.014
Ammonia-total (mg/l N)	0.35
Ammonia-unionized (mg/l NH_4)	0.001
Antimony (mg/l Sb)	0.006
Barium (mg/l B)	<0.035
Beryllium (mg/l Be)	0.001
Cadmium (mg/l Cd)	<0.001
Calcium (mg/l Ca)	67.0
Chloride (mg/l Cl^-)	54.5
Chromium (mg/l Cr)	<0.009
Cobalt (mg/l Co)	0.002
Copper (mg/l Co)	0.005
Fluoride (mg/l F^-)	1.90
Iron (mg/l Fe)	0.013
Lead (mg/l Pb)	0.01
Magnesium (mg/l Mg)	2.79
Manganese (mg/l Mn)	0.001
Molybdenum (mg/l Mo)	0.005

TABLE 1. cont'd.

Characteristic	Well Water Measurement
Nickel (mg/l Ni)	0.025
Phosphorus (mg/l P)	0.006
Silicon (mg/l Si)	4.3
Silver (mg/l Ag)	<0.001
Sodium (mg/l Na)	83.2
Sulfate (mg/l SO ₄ ⁻)	175.4
Strontium (mg/l Sr)	1.30
Tin (mg/l Sn)	0.006
Titanium (mg/l Ti)	0.001
Total Organochlorine (ug/l)	<0.5
Total Organophosphorus (ug/l)	<0.05
Vanadium (mg/l V)	0.14
Zinc (mg/l Zn)	0.006

TABLE 2. Concentrations tested and corresponding percent immobilization of Daphnia magna exposed to Santoflex 13 immediately after spiking the chemical into water.

Nominal Concentration (mg/l)	Percent Immobilization for Combined Replicates	
	24 hours	48 hours
Control	0	0
Solvent Control	0	0
0.25	0	0
0.5	0	9
1.0	26.7	100
2.0	56.7	100
4.0	100	100

TABLE 3. Concentrations tested and corresponding percent immobilization of *Daphnia magna* exposed to Santoflex 13 after aging in well water for 48 hours prior to initiating the test.

Nominal Concentration (mg/l)	Percent Immobilization for Combined Replicates	
	24 hours	48 hours
Control	0	0
Solvent Control	0	0
0.25	0	0
0.50	0	0
1.0	0	0

TABLE 4. Acute toxicity of Santoflex 13 determined by placing Daphnia in test solutions immediately after spiking the chemical into well water and by placing them in test solutions which had aged 24 hours.

Time after spiking to start of test (Hours)	EC50 (mg/l) (95% C.I.)		No Effect Concentration at 48 Hours (mg/l)
	2-4 Hours	4-8 Hours	
0	1.70 (1.28-2.26)	0.51 (0.47-0.56)	0.25
24	0	0	>1.0 mg/l

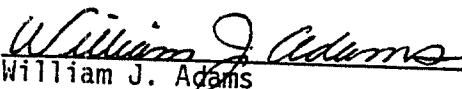
LITERATURE CITED

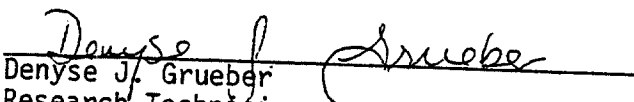
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Submitted by:

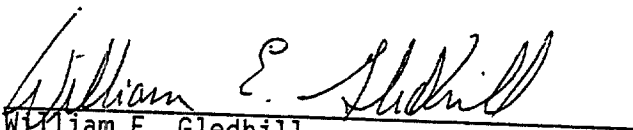
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Triage of 8(e) Submissions

Date sent to triage: MAY 09 1995

NON-CAP

CAP

Submission number: 12058A

TSCA Inventory:

Y

N

D

Study type (circle appropriate):

Group 1 - Dick Clements (1 copy total)

ECO

AQUATO

Group 2 - Ernie Falke (1 copy total)

ATOX

SBTOX

SEN

w/NEUR

Group 3 - Elizabeth Margosches (1 copy each)

STOX

CTOX

EPI

RTOX

GTOX

STOX/ONCO

CTOX/ONCO

IMMUNO

CYTO

NEUR

Other (FATE, EXPO, MET, etc.):

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pages 1

pages 1, DAB

Notes:

Contractor reviewer: POR

Date: 4/26/95

CECATS DATA
Submission # SEHO 1292-12058 SEQ A

TYPE INT SUP FLWP

SUBMITTER NAME: Monsanto Company

INFORMATION REQUESTED: FLWP DATE: _____
0501 NO INFO REQUESTED
0502 INFO REQUESTED (TECH)
0503 INFO REQUESTED (VOL ACTIONS)
0504 INFO REQUESTED (REPORTING RATIONALE)
DISPOSITION:
0601 REFER TO CHEMICAL SCREENING
0602 CAP NOTICE

VOLUNTARY ACTIONS:
0601 NO ACTION REQUIRED
0602 STUDIES PLANNED/IN PROGRESS
0603 NOTIFICATION WORKING
0604 LABELS/MSDS (TANG'S)
0605 PROCESS/MSDS (TANG'S)
0606 A/P/USE DISCONTINUED
0607 PRODUCTION DISCONTINUED
0608 CONFIDENTIAL

SUB DATE: 11/25/92 OTS DATE: 12/2/92 CRAD DATE: 01/26/95

CHEMICAL NAME:

Santoflex 13

CASE

793-24-8

INFORMATION TYPE:

P.F.C.

INFORMATION TYPE:

P.F.C.

INFORMATION TYPE:

P.F.C.

0201	ONCO (HUMAN)	01 02 04	0216	BPCLIN	01 02 04	0201	BARLINO (ANIMAL)	01 02 04
0202	ONCO (ANIMAL)	01 02 04	0217	HUMAN EXPOS (PROD CONTAM)	01 02 04	0202	BARLINO (HUMAN)	01 02 04
0203	CELL TRANS (IN VITRO)	01 02 04	0218	HUMAN EXPOS (ACCIDENTAL)	01 02 04	0203	CHEM/PHYS PROP	01 02 04
0204	MUTA (IN VITRO)	01 02 04	0219	HUMAN EXPOS (MONITORING)	01 02 04	0204	CLASTO (IN VITRO)	01 02 04
0205	MUTA (IN VIVO)	01 02 04	0220	BOD/AQUA TOX	01 02 04	0205	CLASTO (ANIMAL)	01 02 04
0206	REPRO/TERATO (HUMAN)	01 02 04	0221	ENV. OCCUR/FATE	01 02 04	0206	CLASTO (HUMAN)	01 02 04
0207	REPRO/TERATO (ANIMAL)	01 02 04	0222	BIOM INCI OF ENV CONTAM	01 02 04	0207	DNA DAMAGE/PAIR	01 02 04
0208	NEURO (HUMAN)	01 02 04	0223	RESPONSE REPOST DELAY	01 02 04	0208	PRODUSE/PROC	01 02 04
0209	NEURO (ANIMAL)	01 02 04	0224	PRODUSE/CHEM ID	01 02 04	0209	MSDS	01 02 04
0210	ACUTE TOX (HUMAN)	01 02 04	0225	REPORTING RATIONALE	01 02 04		OTHER	
0211	CHR. TOX (HUMAN)	01 02 04	0226	CONFIDENTIAL	01 02 04			
0212	ACUTE TOX (ANIMAL)	01 02 04	0227	ALLERG (HUMAN)	01 02 04			
0213	SUB ACUTE TOX (ANIMAL)	01 02 04	0228	ALLERG (ANIMAL)	01 02 04			
0214	SUB CHRONIC TOX (ANIMAL)	01 02 04	0229	METAMPHETAMACD (ANIMAL)	01 02 04			
0215	CHRONIC TOX (ANIMAL)	01 02 04	0230	METAMPHETAMACD (HUMAN)	01 02 04			

INFORMATION TYPE: NON-COL INVENTORY

ONGOING REVIEW

SPECIES

TOXICOLOGICAL CONCERN

USE:

PRODUCTION:

CAS SR

YES

YES (DROP/REFER)

Daphnid

LOW

NO

NO (CONTINUE)

Fish

MED

IN IT RATION

Algae

HIGH

Tox Concern

ID
12058A

AQUATO

H

COMMENT

AQUATIC TOXICITY TO DAPHNIA MAGNA IS OF HIGH CONCERN WITH A 48 HOUR EC50 OF 0.5100 MG/L AND AN LC50 GREATER THAN 1.0 MG/L (AFTER CHEM. TRANSFORMATION). NOMINAL CONCENTRATIONS WERE USED.